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(54) Method of manufacturing multilayer board.

(57) A method of manufacturing a thick multilayer board. Intermediate layers are formed by two consecutive head boxes disposed on a fourdrinier wire, in which layers the pulp suspension consistency is so high that the forming pulp layer reaches in a head box slice or immediately after it such a fibrage degree that fibres cannot significantly move themselves as regards to one another. Dewatering of both pulp layers takes place though a fourdrinier wire.

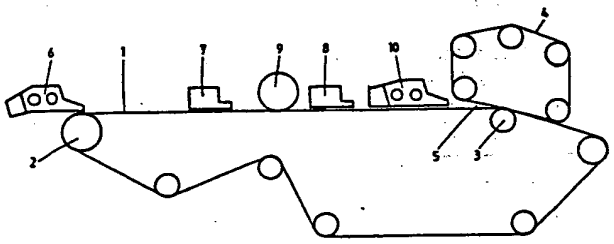

FIG. 1

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Method of manufacturing multilayer board

The present invention relates to an improved method of manufacturing multilayer board webs.

When manufacturing multilayer board layers of different qualities are used. The core layer that gives sturdiness and rigidity to the board is often manufactured from pulps made of waste paper, whilst the surface layers or at least one surface layer is usually consist made from bleached pulp of better quality.

With multilayer board machines in which several pulp layers are bonded by wet pressing, a strong and rigid packaging board that has good printing qualities and a grammage of 200 -600 g/ m^2 can be produced with low costs for raw materials.

A very old method of manufacturing multilayer board involves manufacturing the layers with cylinder moulds. The driving speed of cylinder moulds is, however, relatively slow and high stock consistencies cannot be used in them which thus involves large dewatering quantities. In addition, a plurality of cylinder moulds are needed if the board is required to be very thick.

Fourdrinier wire machines can be driven at higher speeds than cylinder moulds and the sheet formation can be better controlled in them. Multiwire fourdrinier machines are most suitable when manufacturing thin board qualities. High investment and running costs, however, limit the use of these machines.

The main object of the present invention is to provide a method of manufacturing high grammage (500 - 700 g/m^2) multilayer board with simple means. This is achieved by the method according to the present invention which is substantially characterized in that two superposed pulp layers are formed by consecutively disposed head boxes disposed discharging onto the same fourdrinier wire, the stock consistency in at least two of the head boxes being so high that the forming pulp layer reaches a slice channel of the head box or after the stock has been discharged from the head box slice the pulp layer has such a degree of felting that the fibres cannot significantly move on the wire in relation to one another, and that dewatering takes place in both pulp layers through the wire.

The invention will be described further by way of example with reference to accompanying drawings in which

Fig. 1. is a schematic section of a web forming section in a board machine according to one embodiment of the invention;

Fig. 2. is a schematic section of web forming section in a board machine according to another embodiment of the invention; and

Fig. 3. is a schematic section of a web forming section in a board machine according to yet another embodiment of the invention.

A web forming section of a board machine is illustrated in Fig. 1. and is a twin wire former comprising a first wire arrangement or first wire 1 having a main run which generally extends horizontally from a breast roll 2 to a forming roll 3 and a second wire arrangement or wire 4 which forms with the first wire a gap 5 that tapers towards the forming roll. After the forming roll 3 both wires run diagonally downwards and the second wire 4 is detached from the first wire. Under the horizontal section of the first wire 1 are disposed known (not shown), wire supporting dewatering devices such as vacuum boxes and foils which effect dewatering downwardly through the wire.

The stock forming the first outer ply of the board is fed onto the first wire 1 by a headbox 6 which is disposed at the breast roll 2 and operates at a normal consistency range of 0.1 to 1.2 %.

The layers forming the core of the multilayer board are produced by feeding stock onto the wire on top of the already formed web layer by two high consistency head boxes 7 and 8 disposed at a distance from each other in which the stock consistency is substantially higher than the normal head box consistency, e.g. 3 %.

A head box of this type is described in e.g. Finnish patent publication 56221. When the slice spray reaches the wire at this consistency, the drainage of the pulp does not take place in the same way as at a normal head box consistency, but rather the web is formed in such a way that the fibres form a continuous network across the whole thickness of the web in the slice channel of the head box or immediately after it. The web structure becomes felted and there is a relatively strong z-orientation of the fibres in the web. The structure of a web formed at a normal consistency is on the contrary stratified. During the web formation the felted structure remains more open than the stratified structure which means that dewatering of such a web is easier than that of a web formed at a normal consistency which again makes it possible to drain water from the pulp layer formed by the head box 8 downwards through the pulp layer formed by the head box 7. Since the quantity of water to be drained from the pulp layers is considerably smaller than that to be drained from pulp layers formed at a normal consistency, both layers can be thick and a thick core can be produced by two head boxes. Due to the fibre orientation, the core also has a higher bulk than a core formed at a normal consistency.

The web formation of a multilayer board can be improved by treating the web by means of a dandy roll 9 disposed between the head boxes 7 and 8.

The second thin outer ply is supplied by a head box 10 which is disposed in front of the gap formed by the first and second wires 1 and 4 and which operates at a normal consistency range. The web layers on the forming roll 3 are pressed between the wires 1 and 4 and due to the centrifugal force water is drained upwards through the wire 4. Subsequently the thus formed 4-ply web is guided by known methods to the press and dryer sections of a board manufacturing machine for further treatment.

The stock consistency in the high consistency head boxes 7 and 8 can be 1.5 - 6% or higher, preferably

2 - 4 %. The grammage of the core layers formed at a high consistency can be 100 - 300 g/m^2 or higher; preferably 150 - 250 g/m^2. Thus a 4-ply board with a grammage of ca. 600 g/m^2 can be manufactured on a relatively short twin wire former.

The web forming section of a multilayer board machine shown in Fig. 2. comprises a twin wire former 11 combined with a fourdrinier wire section 12 disposed below it.

The first outer ply is formed by a head box 6 operating at a normal pulp consistency range and the core layers by two high consistency head boxes 7 and 8 in the twin wire former. In the horizontal section of the wire 1 water is drained downwardly through the wire and on the forming roll 3 upwardly through the second wire 4.

The second outer ply is formed by feeding stock from a head box 14 operating at a normal pulp consistency range onto the wire 13 of the fourdrinier wire section 12. The web layers are bonded by pressing the layers formed in the twin wire former by means of a transfer roller 15 against the layer formed on the wire 13.

The web forming section of a board machine shown in Fig. 3. comprises a twin wire former 16, a fourdrinier former 17 and a fourdrinier wire section 18 disposed below them.

A thin underliner is formed by a head box 19 operating at a normal consistency range of the twin wire former and on top of this are formed intermediate layers by two high consistency head boxes 20 and 21.

The top layer is formed by the fourdrinier former 17 and the back layer by the fourdrinier wire section 18. The webs are bonded on the wire 22 of the fourdrinier wire section.

Example:

	Head box consistency %	Grammage g/m^2
Top layer	0.4	50
Underliner	0.8	100
First core layer	3.0	250
Second core layer	3.0	250
Back layer	0.4	50

The invention is not only limited to the described embodiments presented as examples, but several modifications and applications may be made of it within the scope of the inventive concept defined by the appending patent claims.

It will be understood by persons skilled in the art that the term "fourdrinier wire" throughout the specification and claims, relates to and is generally understood to mean an endless belt arrangement as is used in fourdrinier machines which is sometimes referred to as a "cloth" and which may, e.g., be made of a wire mesh (mesh of metal filaments) or of a plastics material mesh.

Claims

1. A method of manufacturing multilayer board webs **characterized** in that superposed pulp layers are formed by consecutively located head boxes disposed on the same fourdrinier wire, the stock consistency in at least two of the head boxes being so high that, in a slice channel of the head box or after the stock has been discharged from the head box slice, the forming pulp layer reaches such a degree of felting that the fibres cannot significantly move on the wire in relation to one another, and that dewatering takes place in both pulp layers though the wire.

2. A method according to claim 1 **characterized** in that the mentioned stock consistency is higher than 1.5 %.

3. A method according to claim 2 **characterized** in that the stock consistency is 2 - 4 %.

4. A method according to any one of claims 1 to 3 **characterized** in that the grammage of the pulp layers is 150 - 300 g/m^2.

5. A method according to any one of claims 1 to 4 **charact riz d** in that the formed pulp layer is smoothed by a dandy roll before the next layer is formed on top of it.

6. A method according to any one of claims 1 to 5 **charact riz d** in that the pulp layers form the core of the multilayer board.

7. A method according to claim 6 **characterized** in that the core is formed on top of a thinner pulp layer

formed on the same wire and fed at a lower consistency.

8. A method according to claim 6 or 7 **characterized** in that a thinner pulp layer is formed on top of the core of stock fed at a lower consistency.

9. A multilayer board whenever produced in accordance with any of claims 1 to 8.

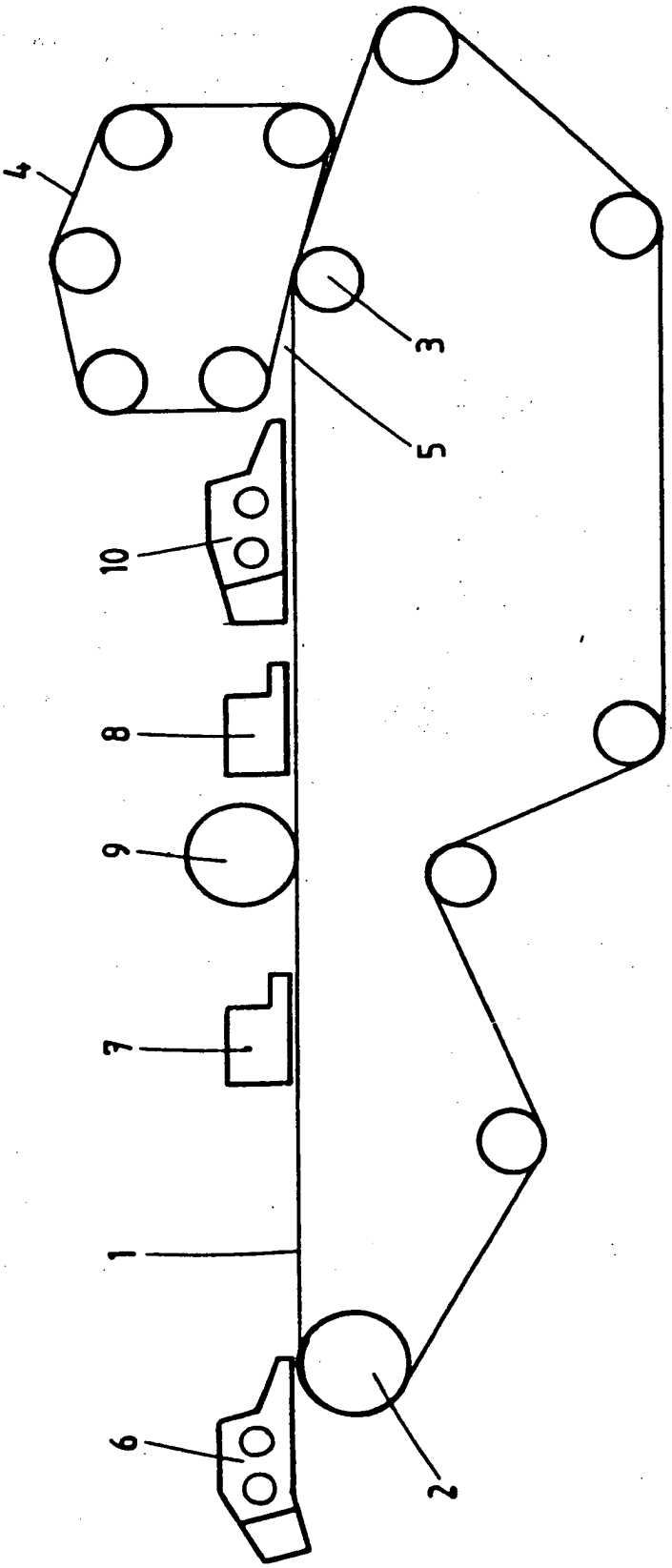

FIG.1

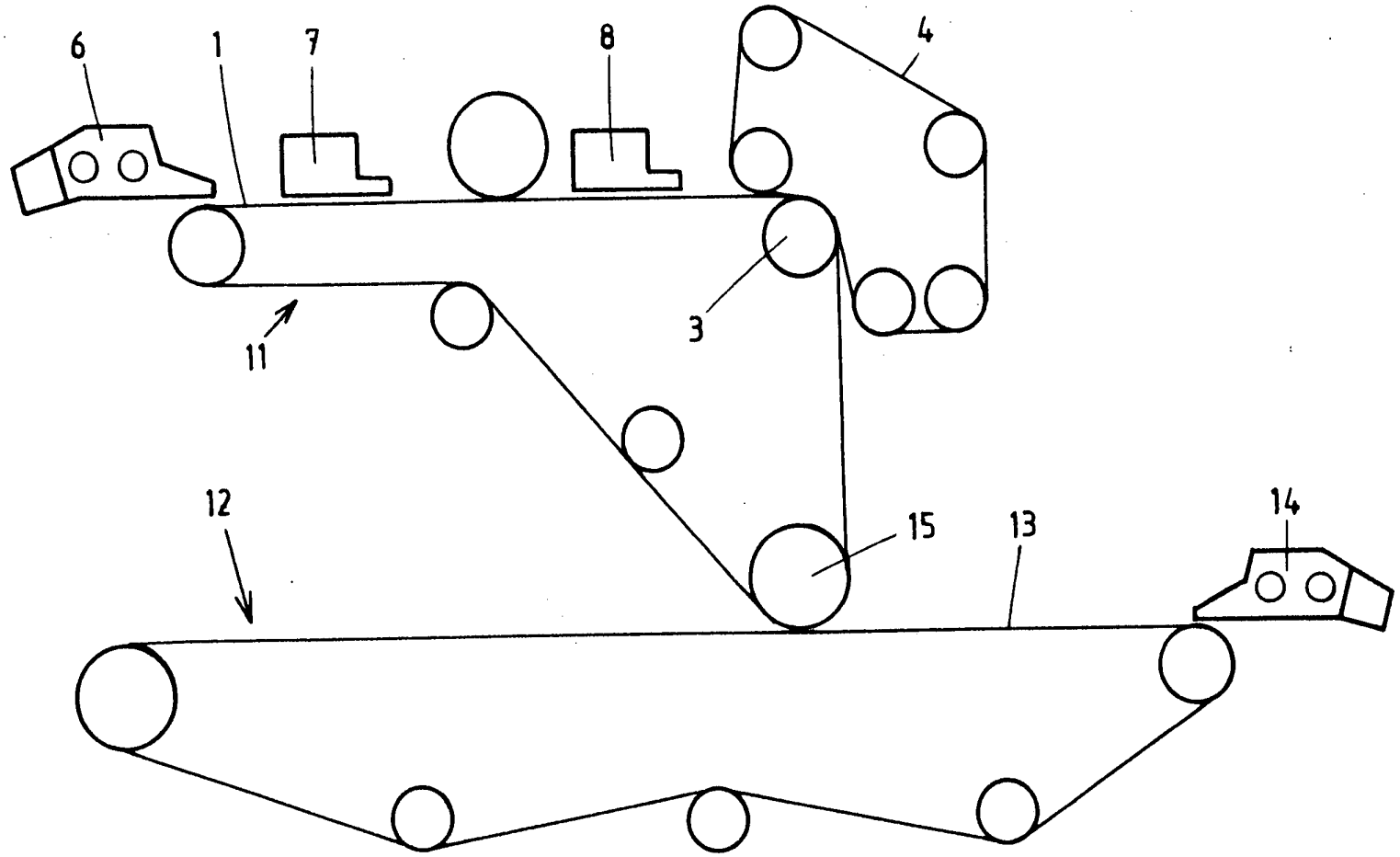

FIG. 2

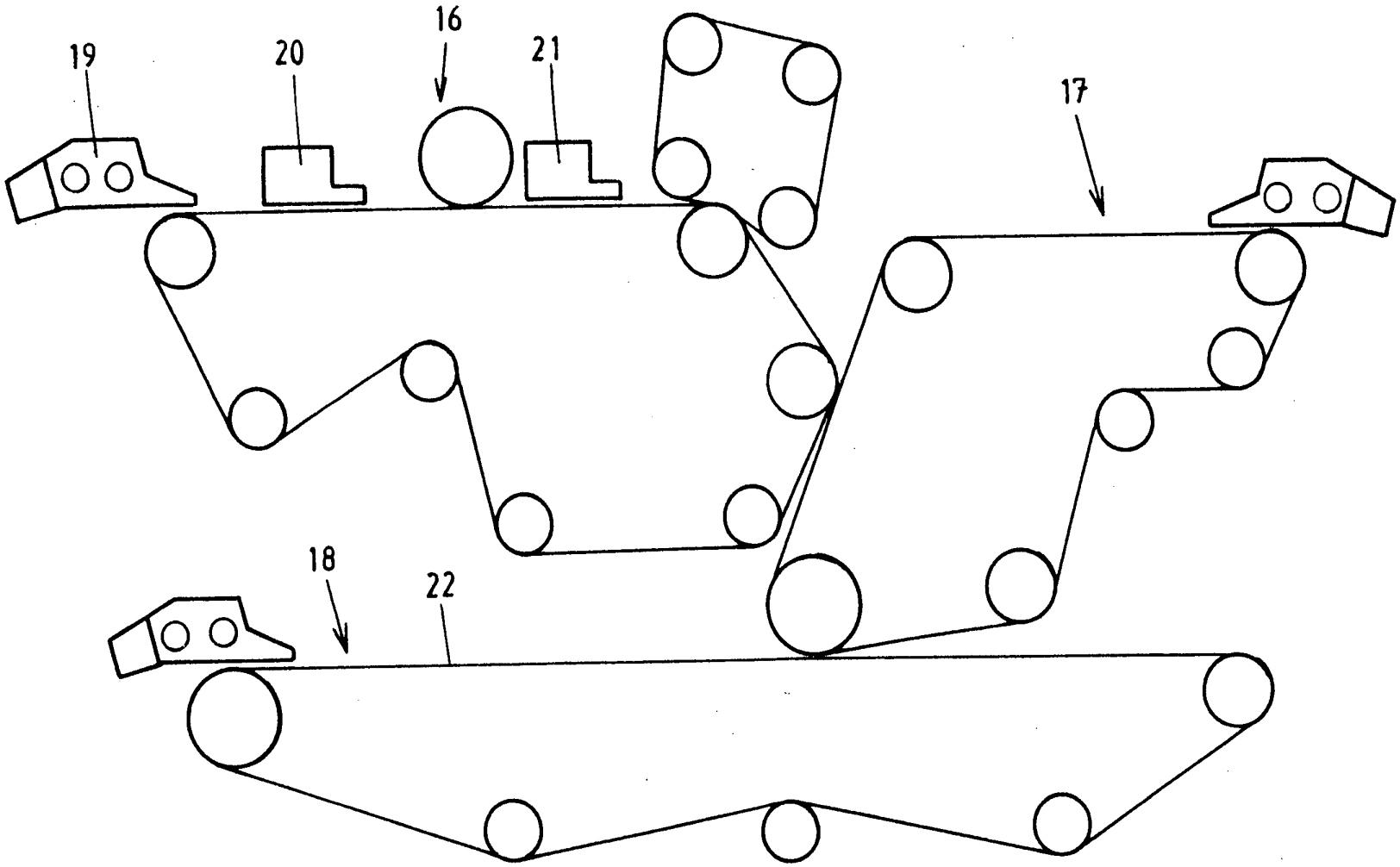

FIG. 3